

CLAIMS

WHAT IS CLAIMED IS:

1. A method of forming a fuel fill assembly for a transportation
5 vehicle, the method comprising:
 - (a) providing a first component of the transportation vehicle, the first component defining an opening;
 - (b) providing a second component of the transportation vehicle, the component defining an opening;
 - 10 (c) providing a plastic annular member extending between a first end and a second end, the plastic annular member having an inner surface defining an open space;
 - (d) applying an expandable polymeric material upon at least one of the first member and the plastic annular member for forming a first seal;
 - 15 (e) applying an expandable polymeric material upon at least one of the second member and the plastic annular member for forming a second seal; and
 - (f) expanding the first seal and the second seal such that:
 - i) the first seal is adhered to a surface of the first
20 component and a surface of the plastic annular member;
and
 - ii) the second seal is adhered to a surface of the second component and a surface of the plastic annular member.
- 25 2. A method as in claim 1 wherein the second component is selected from a body side inner panel and a wheelhouse.
3. A method as in claim 1 further comprising:
maintaining the position of the plastic annular member relative to the
30 first component with one or more mechanical fasteners and assembling the first component to the vehicle prior to the step of expanding the first seal and the second seal, wherein the step of assembling the first component to the vehicle interconnects the opening of the second component with the open

space.

4. A method as in claim 1 wherein the first seal is a substantially continuous annular ring.

5

5. A method as in claim 1 wherein the second seal is a substantially continuous annular ring.

6. A method as in claim 3 wherein the one or more mechanical fasteners are mating fasteners or snap-fit fasteners.

10

7. A method as in claim 1 wherein the first seal and the second seal include at least about 60 % by weight ethylene.

8. A method as in claim 1 wherein the first seal and the second seal include an effective amount of copolymer or comonomer of ethylene for providing crystallinity to the first seal and second seal, the effective amount being up to about 40 % by weight of the material of the first seal and the material of the second seal.

20

9. A method as in claim 1 wherein the two steps of applying the expandable material include heating the expandable material to a viscoelastic state without activating the expandable material.

10. A method as in claim 1 wherein the first seal expands between about 50 % and about 350 %.

25

11. A method as in claim 1 wherein the expandable material for seals is fuel resistant.

30

12. A method as in claim 1 wherein the annular member includes a first flange at the first end and a second flange at the second end, the first seal positioned between the first flange and the first component, the second

seal positioned between the second flange and the second component.

13. A method as in claim 1 wherein the annular member is attached to the first component and the second component without any welds.

5

14. A method of forming a fuel fill assembly for an automotive vehicle, the method comprising:

10

(a) providing a body side outer panel of the automotive vehicle, the outer panel defining an opening;

(b) providing a wheelhouse of the automotive vehicle, the wheelhouse defining an opening;

(c) providing a plastic annular member extending between a first end and a second end, the plastic annular member having an inner surface defining an open space;

15

(d) extruding an expandable polymeric material upon at least one of the outer panel and the plastic annular member for forming a first seal;

(e) extruding an expandable polymeric material upon at least one of the wheelhouse and the plastic annular member for forming a second seal;

(f) maintaining the position of the plastic annular member relative to the outer panel with mechanical fasteners; and

20

(g) expanding the first seal and the second seal such that:

i) the first seal is adhered to a surface of the outer panel and a surface of the plastic annular member;

ii) the second seal is adhered to a surface of the wheelhouse and a surface of the plastic annular member;

25

and
iii) the open space is interconnected with the opening of the outer panel and the opening of the wheelhouse.

30

15. A method as in claim 14 wherein the one or more mechanical fasteners are mating fasteners or snap-fit fasteners.

16. A method as in claim 14 wherein the first seal and the second

seal include at least about 60 % by weight ethylene.

17. A method as in claim 1 wherein the first seal and the second seal include an effective amount of copolymer or comonomer of ethylene for providing crystallinity to the first seal and second seal, the effective amount being up to about 40 % by weight of the material of the first seal and the material of the second seal.

18. A method as in claim 1 wherein the two steps of applying the expandable material include heating the expandable material to a viscoelastic state without activating the expandable material.

19. A method as in claim 1 wherein the first seal expands between about 50 % and about 350 %.

20. A method as in claim 1 wherein the expandable material for first seal and the second seal is fuel resistant.

21. A method as in claim 1 wherein the annular member includes a first flange at the first end and a second flange at the second end, the first seal positioned between the first flange and the outer panel, the second seal positioned between the second flange and the wheelhouse.

22. A method as in claim 1 wherein the annular member is attached to the outer panel and the wheelhouse without any welds.

30